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- (75) Inventor/Applicant (*for US only*): **TAKAHASHI, Naoki**

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(54) Title: FUEL CELL STACK DEFROSTING

(57) Abstract: A fuel cell power plant comprises a fuel cell stack (1) constituted by a plurality of fuel cells which perform electric power generation by means of a reaction of hydrogen and oxygen. A controller (16) determines whether or not moisture inside the fuel cell stack (1) is frozen, and if the moisture is frozen, the controller (16) causes the fuel cell stack (1) to perform intermittent electric power generation via an inverter (27) while continuing to supply oxygen to the fuel cell stack (1). The fuel cell stack (1) generates heat as a result of the electric power generation, whereby moisture is generated in a cathode (9). During the periods in which electric power generation is not performed, the oxygen which is supplied to the cathode (9) of the fuel cells scavenges the generated moisture, thereby ensuring the supply of oxygen to the cathode (9) during electric power generation.

# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/JP 03/07256

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01M8/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 798 186 A (FLETCHER NICHOLAS J ET AL) 25 August 1998 (1998-08-25) abstract column 2, line 51 - line 61 column 3, line 4 - line 54 column 5, line 55 - column 6, line 3 column 7, line 35 - line 36 column 7, line 53 - column 8, line 67	1-20
A	US 2002/009623 A1 (JIA NENG YOU ET AL) 24 January 2002 (2002-01-24) paragraphs '0001!', '0012!', '0016! ----- -/--	1-20



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 329 089 B1 (WILKINSON DAVID P ET AL) 11 December 2001 (2001-12-11) abstract column 1, line 63 -column 2, line 10 column 3, line 51 - line 63 column 4, line 27 - line 39 column 6, line 3 - line 7 column 6, line 49 -column 7, line 15 column 8, line 17 - line 50 -----	1-20
P,X	US 2002/146610 A1 (KANAI YASUSHI ET AL) 10 October 2002 (2002-10-10) paragraphs '0111!-'0120!, '0127!-'0135! -----	1-5,7, 19,20
A	US 2002/051898 A1 (LILLIS MARK A ET AL) 2 May 2002 (2002-05-02) paragraphs '0025!, '0026! -----	8
E	US 2003/162066 A1 (ANDO MASAO ET AL) 28 August 2003 (2003-08-28) paragraphs '0056!-'0070!, '0084! figures 9,10 -----	1-5,7,9, 19,20

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 03/07256

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5798186	A	25-08-1998	AU 2947397 A	07-01-1998
			CA 2257302 A1	18-12-1997
			WO 9748142 A1	18-12-1997
			GB 2330686 A , B	28-04-1999
			JP 2000512068 T	12-09-2000
			US 2003077487 A1	24-04-2003
			US 6479177 B1	12-11-2002
US 2002009623	A1	24-01-2002	US 6479177 B1	12-11-2002
			AU 7396700 A	30-04-2001
			WO 0124296 A1	05-04-2001
			CA 2384863 A1	05-04-2001
			EP 1222704 A1	17-07-2002
			JP 2003510786 T	18-03-2003
			US 2003077487 A1	24-04-2003
			US 2001055707 A1	27-12-2001
US 6329089	B1	11-12-2001	US 6472090 B1	29-10-2002
			US 6096448 A	01-08-2000
			AT 251804 T	15-10-2003
			AU 5667000 A	22-01-2001
			WO 0103215 A1	11-01-2001
			CA 2377604 A1	11-01-2001
			DE 60005836 D1	13-11-2003
			EP 1194969 A1	10-04-2002
			JP 2003504807 T	04-02-2003
			US 2001028967 A1	11-10-2001
			AU 764297 B2	14-08-2003
			AU 5517500 A	31-01-2001
			WO 0101508 A1	04-01-2001
			CA 2377556 A1	04-01-2001
			EP 1194968 A1	10-04-2002
			AU 734803 B2	21-06-2001
			AU 1657499 A	19-07-1999
			CA 2316380 A1	08-07-1999
			WO 9934465 A1	08-07-1999
			EP 1042836 A1	11-10-2000
			JP 2002500421 T	08-01-2002
US 2002146610	A1	10-10-2002	JP 2002305014 A	18-10-2002
			JP 2002313391 A	25-10-2002
			JP 2002313392 A	25-10-2002
			JP 2002313393 A	25-10-2002
US 2002051898	A1	02-05-2002	AU 9485501 A	08-04-2002
			EP 1368848 A2	10-12-2003
			WO 0227814 A2	04-04-2002
US 2003162066	A1	28-08-2003	JP 2003257460 A	12-09-2003
			EP 1343214 A1	10-09-2003